

UNIT 9

INFORMATION SYSTEMS AND
FUNCTIONAL AREA APPLICATIONS

Structure

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9.1 INTRODUCTION

The world is passing through an important era in which knowledge is considered to be a supreme source for all other activities. Well-appreciated strategic decisions are the outcome of good knowledge. Acquirement of knowledge at one point of time and continuous updating keeps a person fit for business survival in the competitive environment. Learning from personal experience is one way of gaining knowledge. But as we know, it takes lot of time and some times it may become impracticable. Knowledge gained through other sources like education, interaction with others and other means is comparatively faster. Information enriches the knowledge. Role of information and knowledge in managerial decision-making is inevitable in nature. In managerial functions, knowledge integrates the activities of different departments and enables the decision maker to take right decisions. Further information enriches the managers about the latest scenario on the vital areas of functional management like Finance, Marketing, Human Resource and Operations. Information is not only the foundation for any business; it also plays the role of bricks in building up the business decisions. The generation and dissimulation of information should be a continuous process in the organization.

In this unit you will get an overview of basic information systems with focus on functional areas. The coming two units will deal with HR and Marketing Management and Operations and Financial Management respectively.

9.2 OBJECTIVES

After reading this unit, you should be able to:

- Describe the importance of information in managerial functions;
- Identify the role of information;
- Identify and appreciate the basic information systems;
- Diagnose the situation for development of information system; and
- Attribute the role of information systems in functional areas of management.

9.3 INFORMATION FROM DATA

In simple terms, information is defined as the processed form of statistical data. It is important to note that information and data are different to connote. But they are interrelated. The raw data collected about any phenomenon may be used to generate the required information.

While processing the data for the information, one needs to keep the following in mind.

- Data should be accurate
- Data should be relevant
- Data should be time sensitive

Information processing from the raw data can be represented as an information funnel. Procurement of correct information in right time is one of the important aspects for business decisions. Having the right information in hand, business organization can be proactive in its activities to maximize the business profits. The following schematic chart indicates the position of the information among other relevant characteristics like data, knowledge, and wisdom.

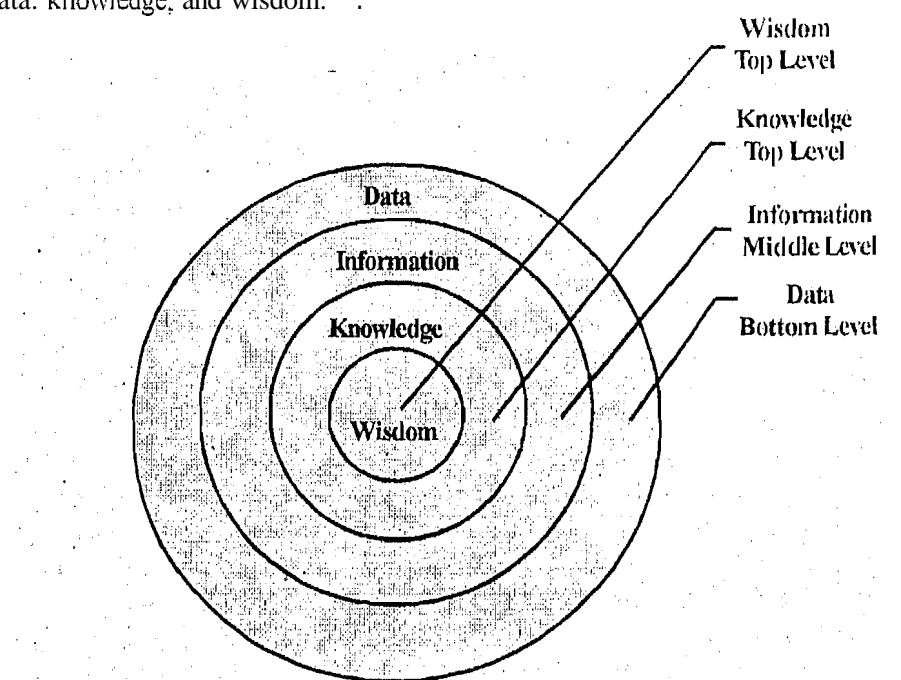


Figure 9.1: Position of the Information

The classification shown below portrays the idea of generation of information from data. The different stages in the process could be stated as:

- Summarizing
- Data trimming/mining
- Presentation and
- Indexing

Data collected for want of information usually available in the form of questionnaire, schedules, note, or the official unclassified formats. The first step towards the analysis is bringing the data into the required form of tables or arrays so that further treatment of data is possible. Grouping of the data under different category will enable the analyst to identify a specific tool for analysis. The manual process of summarizing may lead to the delay in the process. The computerized data processing for summarizing the data through selected software expedites the process. For example the sales data obtained from different sales centers may be required to classify on the basis of various parameters like urban, sub-urban, rural and other backward areas to study in detail about the factors affecting the sales. The data collected from an organization to understand the organizational behavior towards the employees welfare need to be classified on the basis of different categories of employees.

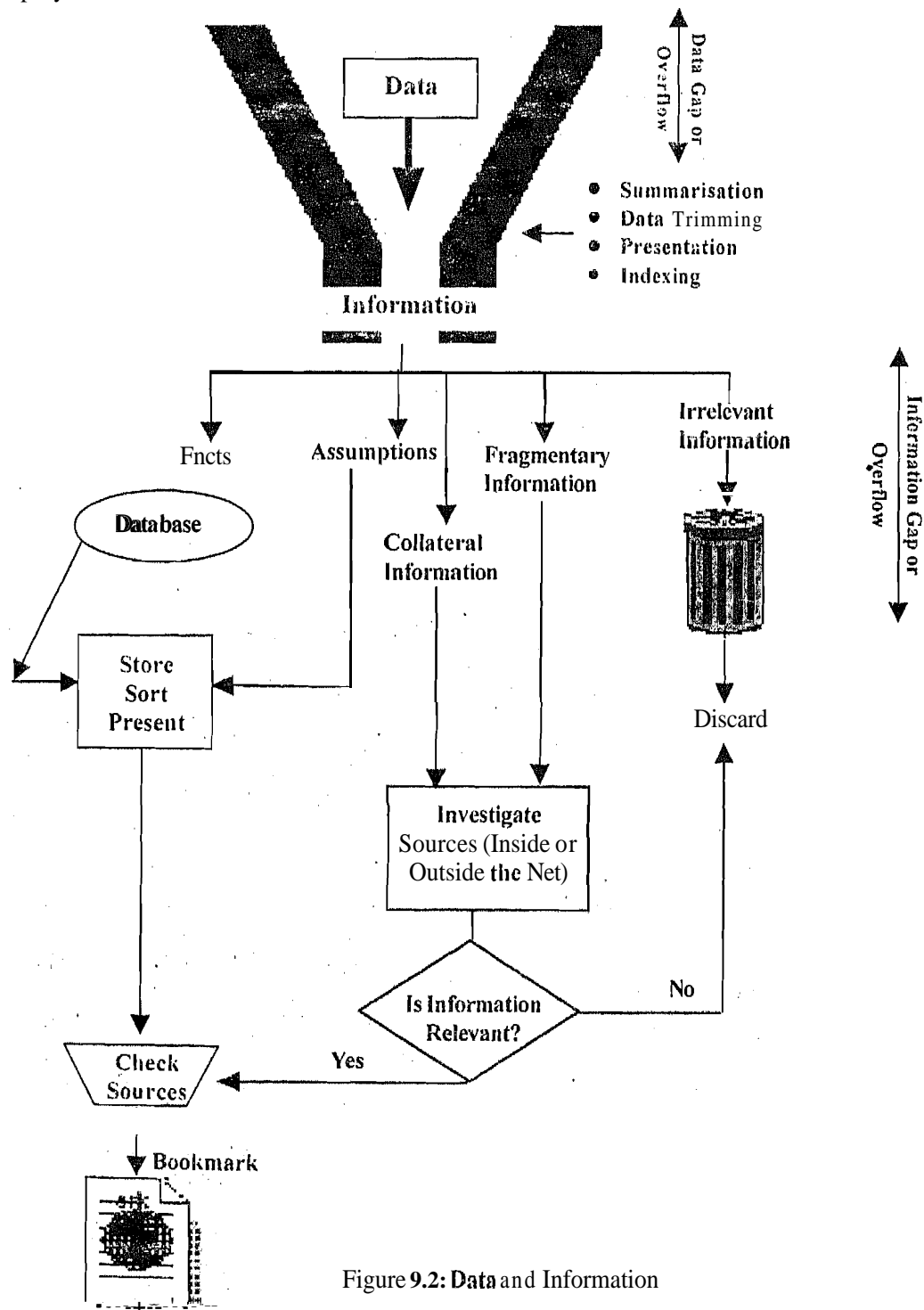


Figure 9.2: Data and Information

Data Trimming

Data trimming is the condensation or consolidation of statistical data for retrieving information. There are specific statistical data reduction tools for trimming the data. Depending upon the nature of the data and the objectives of the study, the tools are decided. In practical situation we come across a huge volume of data for retrieval of information and the application of computers and the statistical software are used at a large scale to draw conclusions. Suppose that the production department in a manufacturing company has the data on the number of units demanded in a year, the number of times ordered, the quantity supplied etc., about its product. The company may be interested to find out various parameters associated with the production like the optimum quantity to be produced, the lead time for the order etc., With the application of statistical packages related to the inventory problems, it is possible to derive the required information.

Presentation

The outcome of the data trimming is the uninterpreted statistical results. The results obtained need to be related to the objectives for the meaningful representation. The process of depicting the statistical results in the desired form (charts, diagrams, schematic representation etc.,) is called presentation. The presented results will reveal the information in a better way. Information, as an object could be derived from the presented results.

Indexing

Indexing or codification of the results is required for further processing of information like storage and retrieval, modification, converting into electronic mode for communication etc., The codification is the base for presenting the information on web pages. In the Internet search the codes are recognized by the computer at a greater speed to retrieve them from the data dictionary or catalog. The big computer databases are designed and used for data retrieval through proper indexing of the data. Thus raw data collected from the field becomes information in the final form. This has been depicted in a schematic representation given above.

9.4 TYPES OF INFORMATION

Information retrieved from raw data could be classified in different categories as:

- 1) Facts
- 2) Assumptions
- 3) Collateral information
- 4) Fragmentary information
- 5) Irrelevant information

Facts are the accurate information. The information generated with the assumption of mathematical models is called reliable information without any uncertainty. In some statistical analysis certain amount of probability is used to predict the required results. Such information may not be 100% true. This type of information is called information based on assumptions. The other type of information is called collateral and fragmentary information. This type of information cannot be directly retrieved but is a parallel source of information. It is not considered to be highly reliable. Such sources need to be investigated for acceptance.. ,

Before going into details about functional area applications of information, let us take some situations that highlight the information requirement and its typology. The following are some of the managerial situations where the information requirement is evident in business situations.

Table 9.1 : **Information Requirement** in Managerial Situations

Situation	Data Availability	Tools for Analysis
A manufacturing company, which is interested to decide about the number of units to be produced in the next month to meet the market demand.	Sales Data	Statistical Forecasting
Financial institution wants to decide about the better options available for the investment	Financial reports/ balance sheets of different companies	Internal rate of return (IRR) and Yield to maturity (YTM)
The personal department in an organization, which is interested in deciding about the number of marketing executives to be recruited for the next quarter.	Data available with personnel department	Replacement problems for personnel recruitment.
Service branch of a nationalized bank would like to determine the number of counters to be kept open during the peak hours to serve the customer with the most satisfaction.	Yearly Data on the number of customers visit the bank during different seasons	Waiting Line Models

In each of these above situations the manager responsible for taking decisions requires sufficient information from the relevant records available with the organization. The term **information means** collection of facts from which business decisions can be drawn. Facts and figures collected in this connection will enable the company to go for a valid decision.

9.5 INFORMATION IN MANAGERIAL FUNCTIONS

With the representation of Antony's structure, the data available at different functional areas of management could be presented as follows:

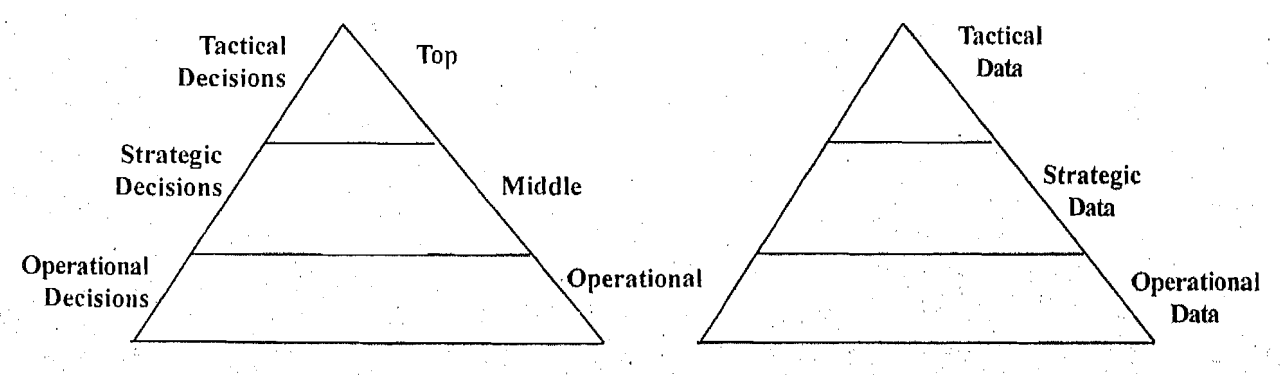


Figure 9.3: Data Available at Different Functional Areas

At operational level, organization gets in contact with public for information procurement and dissemination. All types of inputs available from various sources are gathered at this level. The routine office work like maintaining inward register, maintaining of public relations, understanding the external requirement etc. are mostly done at this level. Though no decision making process is carried out, proper accumulation of data has to be done at this level for further processing.

Hence it is sufficient to have a trained manpower that can act as per the computer-assisted instructions. At middle level of management, the input obtained from internal and external sources of information will be processed for strategic decisions. This level consists of middle level managers who can contribute significantly for the development of organization. Different options available for each of the objectives are evaluated carefully using the scientific tools of analysis and outcomes are reported. The role of middle level decision process is considered to be very crucial because the output received from this level is taken as input for tactical decision-making. The highest level in this hierarchy is the tactical decisions. This is the decision-making group which should ultimately be supported by the online information.

To highlight the information needs of the organization; the sources are classified as internal and external. We may consider the following classification to understand the types of elements providing information in general for any organization irrespective of its nature.

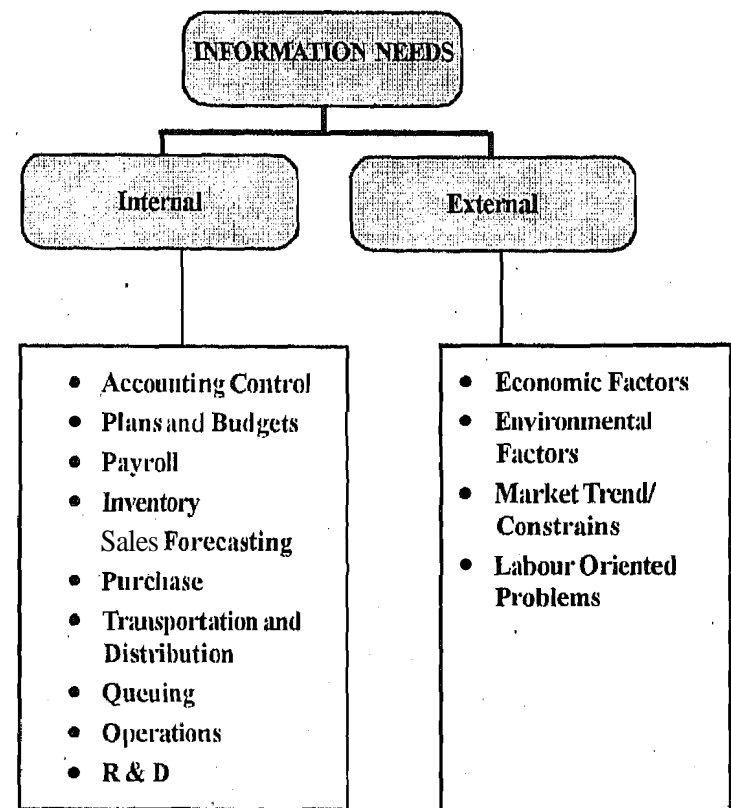


Figure 9.4: Classification of Information Needs

Educating the managers of the companies to understand the information generation, treatment of information and applications in real decision-making is very essential. The task of information generation, process of information, management of information and timely communication or dissimulation is interrelated and hence a systematic approach is required. As the important and risky business decisions are based on the available information, adequate care should be taken to have the right information.

The information perspective in an organization is viewed categorically for managers as well as for the organization. The managers use the information as an object for managerial decisions, as a construct to build up the organization and tools to gain explicit and tacit knowledge. But for the point of view of the management, information should be treated as a resource, as perception pattern for the development, as a commodity to be appreciated and as constituent force to meet the internal and external changes.

The links among the perspectives on information in an organization and as a manager are shown below.

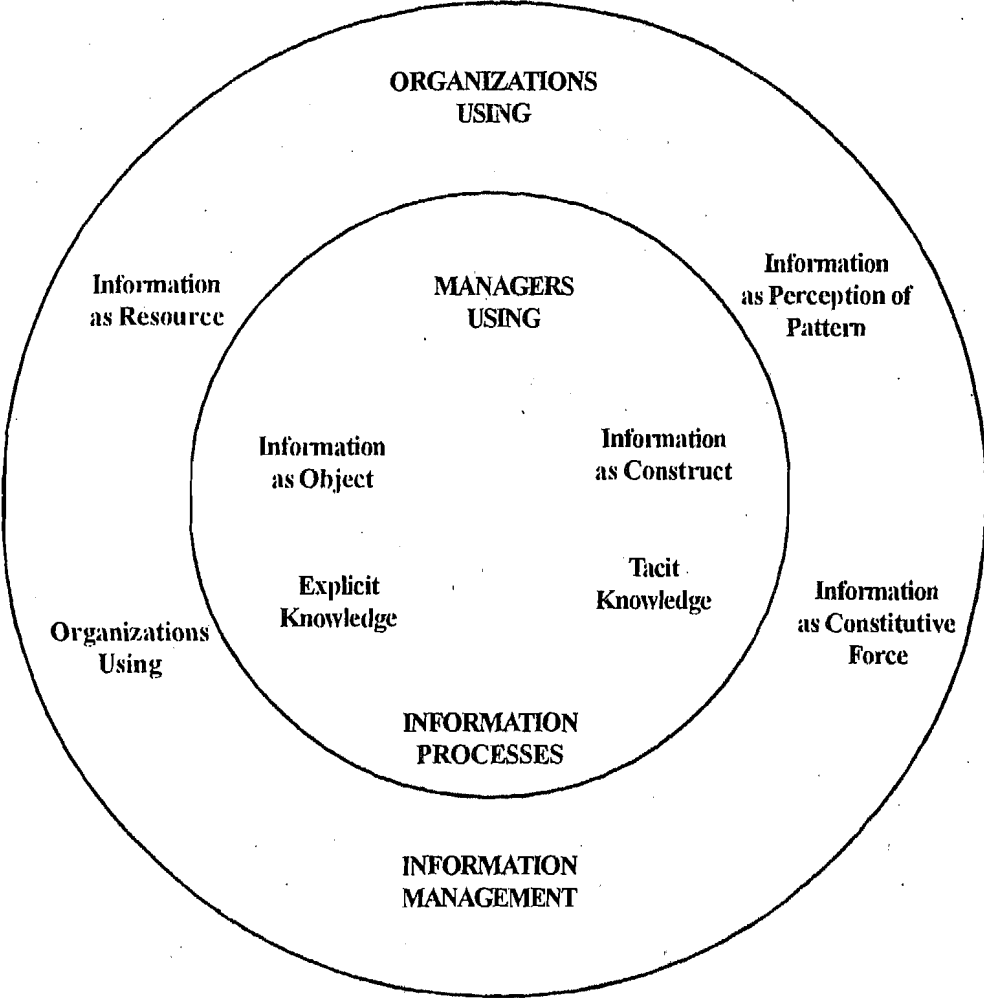


Figure 9.5: The Information Environment in Organizations

9.6 INFORMATIONSOURCE : INTERNFT

In modern days, Internet is used as a base for information retrieval. One can have access to any kind of information amounting to any quantity through Internet. Most of the business enterprises have got their own web pages as it is being used mainly to promote the business. The advancement in communications and information technology made it feasible to use the computer to access any website for the information through the search engines available. Search engines on the net have indeed become an unmatched feedstock of information. It has come as a boon for information seekers. There are two ways of finding information on the net. These are the web directories and search engines. While web-directories hold predefined list of websites and are compiled by human editors, search engines employ technology that basically looks through a database of indexed web sites and find the information for you. The search engines have a huge database that is built up by the 'spiders' which are nothing but programs that search the web for new pages, links on the pages to match the indexed words with the URL of the page. The familiar search engines, which are available on net for search, are *google search*, *yahoo search*, *msn search*, *sify search*, and *webdunia* etc.

Internet communication has become a global mode of communication for most of the activities of marketing. The communication or deal of business between the customers and suppliers is done through the web sites, The prospective customers

access the websites of the supplier company available on Web and browse through the web pages for the information about the product and submit the query or order the product directly from the remote computer. The prospective customer-using Web may surf different websites of the companies dealing in the same products and strike the best bargain not moving from his premises. The customer may make the payment through credit card on the Internet for his purchases. The concept of doing business transactions through Internet is called electronic commerce, which is gaining familiarity nowadays.

Activity A

You are working in an FMCG company as a manager. Your company wants to launch a new product. Search the web to find out the similar products by different companies and make a comparative chart of the critical information that will help the cause of your company.

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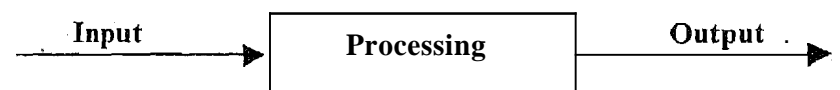
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9.7 INFORMATION SYSTEMS IN MANAGEMENT

Information handling in an organization should be a systematic process. Generally systems are created to solve problems. One can think of the systems approach as an organized way of dealing with a problem. A collection of components that work together to realize some objective forms a system. Basically there are three major components in every system, namely input, processing, and output.



In a system the different components are connected with each other and they are interdependent. For example, Human body represents a complete natural system. We are also bound by many national systems such as political system, economic system, educational system, and so forth. The objective of the system demand that some output is produced as a result of processing the suitable inputs.

In business information processing system, it receives input as data and instructions, process them under the defined instructions and gives output. The inputs to the system may be from a data file, Internet source, or manual feed. Further the system interacts with human or computers to support the operational and managerial decision making of an organization.

The managers should be well aware of information systems because:

- The amount to be spent on the information system should have positive effect on profit making
- It increases business awareness, promotes business re-engineering and enables total quality management to the managers
- If the managers are not acquainted with the information systems, significant amount will be wasted on automating ineffective process- or at the extreme, companies can fail as a result of poor management.

The organization expands in the direction of information expansion. Flexibilities in information handling help the managers to take advantage of all business opportunities irrespective of small or large-scale enterprises. Some of the important implications about the system development and management on information are as follows:

- 1) Information system will contribute substantially to the managers in their effective decision-making to achieve the organizational objectives;
- 2) Information system will enrich the organization to meet the competitive challenges;
- 3) Adequate knowledge from the past experience will help the Managers to integrate the business strategy;
- 4) Information system will provide sufficient awareness about the external components to react accordingly;
- 5) Information system is required to take right decisions in right time.

The effectiveness of information management can be measured by the extent of knowledge creation or innovation in organizations. The process approach to information management supports the integration of business strategy and information. Some of the important implications about information management are as follows:

- 1) If information is conceptualized as a process it can be integrated into strategy formation
- 2) Information management should account the information as an object and as a construct
- 3) It has a role in enhancing the information capabilities of individuals in organizations
- 4) Almost all managerial activities have an information component and so information management practice should be responsive to the needs of managers as information users and as information producers or knowledge creators.

The importance of information in management is further emphasized by the fact that much of management is primarily decision making. While there are several views of what constitute management, the generally accepted planning, organizing, coordinating, directing, and control are all concerned with decision-making. Several functional areas of management viz. Personnel, Marketing, Production, Finance and Services will be significantly influenced by the information systems that are to be implemented in an organization. Information once acquired need to be communicated promptly to various departments as per their requirement. The free exchange of information in an organization is called information flow. Information flow integrates various levels of management discussed earlier. Operational decisions deals with a large volume of internal data. The middle management is concerned with medium range or tactical decisions required for much less information. The top management being concerned with long term or strategic decisions requires for just a few vital internal information but a lot of external information. The successful information system should take into account such a pattern of information needs by the management.

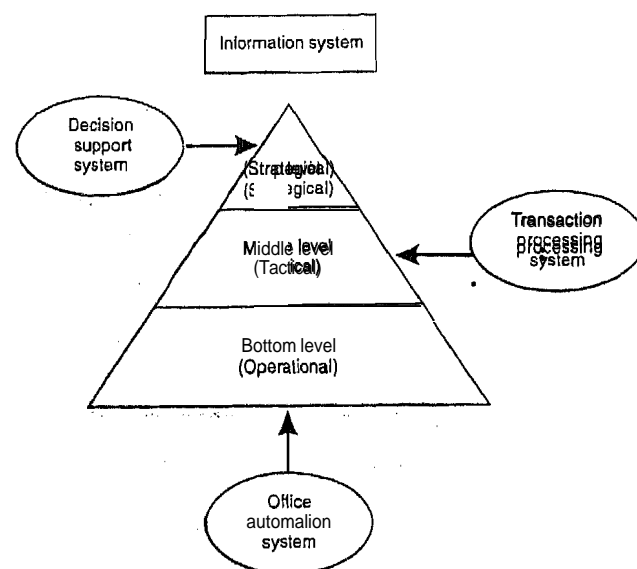


Figure 9.6: The Information Systems and Management Levels

Typical example of the three levels of information among the functional areas of management can be represented with the help of a pyramid structure as follows:

All the four major areas of management are inter-related. Creating a master database comprising of the activities of the organization irrespective of the specific area, it is possible to retrieve the data for any further information. This kind of approach is called integrated data approach and the development of system is called integrated system. The master database created here should be flexible to have the following features:

- 1) Distribute and share the data on network,
- 2) Nonnormalized to accept the unique characteristics,
- 3) Capable of automatic updating,
- 4) Quick query.

The following diagram depicts the creation of centralized database for application to various functional areas of management.

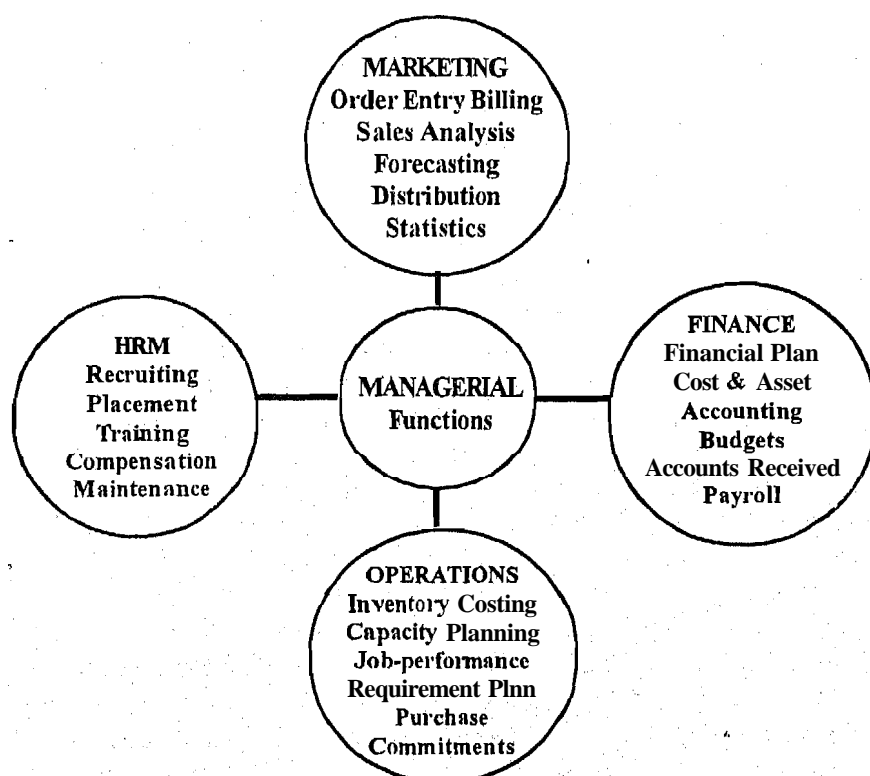


Figure 9.7: Creation of Centralized Database for Various Functional Areas Application

A typical example of role of information systems for the important areas of functional management at different level of decision-making is shown below:

Table 9.2: A Typical Example of Role of Information Systems

	Production	Finance	Personnel	Marketing
Strategic	New Plant Location	Alternative Financing	Welfare Policy	Competitor Survey
Tactical	Production Bottleneck	Variance Analysis	Performance Appraisal	Advertising
Operational	Daily Scheduling.	Payroll	Leave Records	Sales Analysis

9.8 SYSTEM DEVELOPMENT:
A STRATEGIC PLANNING PROCESS

Development of an information system requires adequate planning. The purpose of system development needs to be analyzed and understood. As it involves cost component, feasibility of the system development need to be discussed at a length. The planning process consists of strategic planning which provides general guidance on long-term objectives and operating plans deals with short-term objectives. Each of the business organization is expected to have its own planning process. The hierarchy of the steps for strategic planning for the system development is as follows:

Table 9.3: Strategic Planning for the System Development

Step	Activity	Implication
1	initiation	Begins when a sponsor identifies a need or an opportunity, Concept Proposal is created.
2	System Concept Development	Defines the scope or boundary of the concept. Includes Systems Boundary Document, Cost Benefit Analysis, Risk Management Plan and Feasibility Study.
3	Planning	Planning: Develops a Project Management Plan and other planning documents. Provides the basis for acquiring the resources needed to achieve a solution.
4	Requirement Analysis	Analyzes user needs and develops user requirements, creates a detailed Functional Requirements Document.
5	Design	Transforms detailed requirements into complete, detailed System Design Document. Focuses on how to deliver the required functionality.
6	Development	Converts a design into a complete information system. Includes acquiring and installing systems environment: creating and testing databases/preparing test case proczdures: preparing test files: coding, compiling, refining programs; performing test readiness review and procurement activities.
7	Integration and Test	Demonstrates that the developed system conforms to requirements as specified in the Functional Requirements Document. Conducted by the Quality Assurance staff and users. Produces Test Analysis Reports.
8	Implementation	Includes implementation preparation, implementation of the system into a production environment, and resolution of problems identified in the Integration and Test Phase.
9	Operational Maintenance	Describes tasks to operate and maintain information systems in a production environment, Includes Post-Implementation and In-Process Reviews.
10	Disposition	Describes end-of-system activities. Emphasis is given to proper preservation of data

Source: <http://www.usdoj.gov>

In short the tasks pertaining to design a system consists of defining the problem, understanding the management objectives, identifying the system constraints, understanding the need for information, searching for alternative designs and finally documenting the concept. The following schematic presentation depicts the typical planning process of a system development.

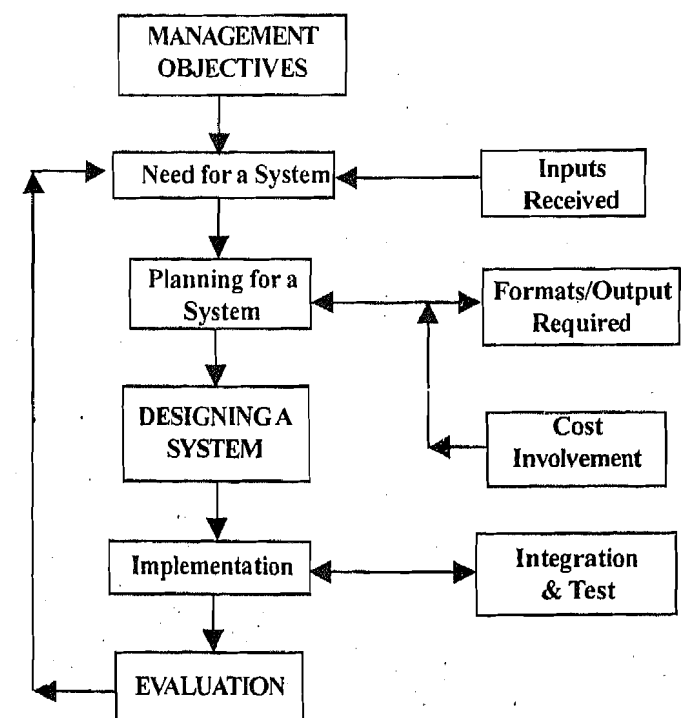


Figure 9.8: Typical Planning Process of System Development

System life Cycle

System development life cycle means combination of various activities. In other words we can say that various activities put together are referred as system development life cycle. In the System Analysis and Design terminology, the system development life cycle means software development life cycle.

Following are the different phases of software development cycle:

- System study
- Feasibility study
- System analysis
- System design
- Coding
- Testing
- Implementation
- Maintenance

The different phases of software development life cycle is shown in the following Figure.

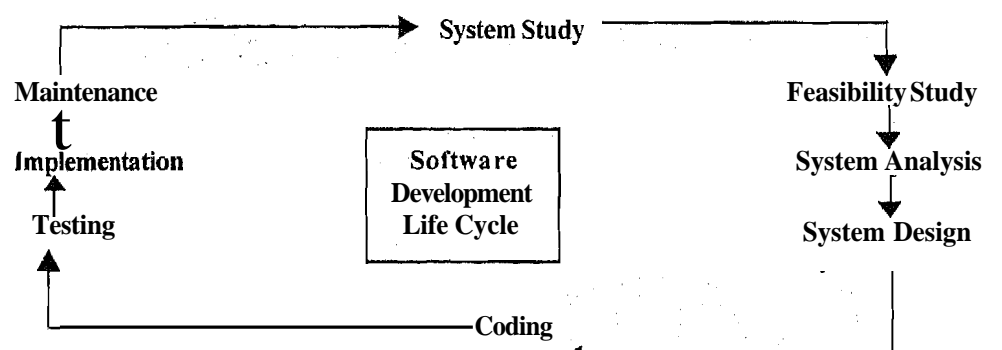


Figure 9.9: Different Phases of Software Development Life Cycle

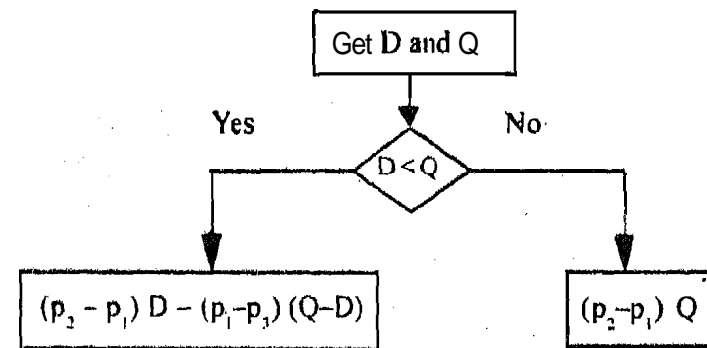
9.9 PROGRAMMED AND NON-PROGRAMMED DECISIONS

Managerial decisions are classified into programmed and non-programmed categories. There are some situations in which the analytical methods of decision-making is possible and some other situations one need to apply the intuitive methods of decision-making. Programmed decisions are those that can easily be automated, like the determination of optimal product mix, minimum cost production schedule, optimal sequencing of machines to minimize mean flow time etc. Generally large data and a few decision rules or algorithms that use the data in an automated fashion to arrive at an optimal plan characterize such decisions. Techniques of Operations Research like Linear Programming represent a typical example of this category of decisions that use formal data and algorithms. Naturally such decisions are easily programmed. In other words they can be represented as an algorithmic procedure into unambiguous instructions whose step-by-step execution will lead the optimal result. Since these algorithms are likely to be codified in the form of a computer program and run on a digital computer, they are programmable or programmed decisions. The key to such programmability is the underlying structure of these decision situations that permit an algorithmic translation. Many of the programmed decisions may need the most challenging algorithms involving the best brains available at that moment for their solution. Nevertheless they are translatable into algorithmic procedures. Simon's predictions of the fifties have practically come true in the nineties. This is borne out by the large number of decision support systems that use data and models to automate such decisions - reorder levels in materials and production control, control limits for process re-setting etc. Information support for such programmed decisions can be designed rather easily.

Non-programmed decisions on the other hand do not lend themselves to easy automation. The model support for such programmed decisions would need more of heuristics rather than optimal algorithms. Optimization Algorithms as mentioned earlier, are formalized procedures readily implemented as a finitely terminating, computer programs with guaranteed outcome of optimal solutions, whenever they exist. Heuristics, on the contrary, generally yield near optimal if not the optimal solution but cannot guarantee optimality. The heuristics themselves may be implemented in the form of an algorithmic procedure and solved on a computer; however the decision situation may not have admitted any optimal algorithm. The interesting developments in complexity theory of the theoretical computer science also led to an interesting observation that for many interesting optimization problems, heuristics are necessary as no optimizations algorithms with reasonable estimates of computational performance are known to exist. This idea led to the heuristic problem solving approach where one gets good solutions and even optimal solutions but optimality cannot be guaranteed. Such heuristic procedures for the solution of many real-world problems in the area of scheduling and resource allocation have been found to be extremely successful.

Over the years the programmed and non-programmed decisions have also been known as structured and unstructured decisions. While designing, information systems one should keep this vital difference between the two types of decisions in mind. Flexible access to data, user friendliness, graphical user interfaces, natural language support, what-if analysis, capability, etc. characterize information support for non-programmed decisions.

Example for Programmed Decisions: Consider the problem faced frequently by a small and medium sized enterprises (SMEs) in deciding about the size to be ordered to maximize the profit on consumable items (number of units of food packets). The small-scale enterprise is doing the business of trading between the wholesaler and retailer. The purchase price per unit is p_1 and the selling price is p_2 where $p_2 < p_1$. The unsold item for the season/for the day will make a loss to the dealer and hence the dealer will be able to return it at the lower price p_3 ($p_1 > p_3$). The objective is to decide about the number of units to be ordered to maximize the profit. The intuitive approach to this problem will lead to problem specific and cannot be conceptualized. It is better to think of using structured analysis or analytical approach. Assume that the number of units demanded is D and the quantity ordered is Q . The logical flow of this approach is



This is called conceptualization of the problem. Once the problem is conceptualized, we can give the mathematical function to the problem,

The mathematical formulation to find the profit to this problem with the above notations is:

$$\text{Profit} = \begin{cases} (p_2 - p_1) Q & \text{if } D \geq Q \\ (p_2 - p_1) D - (p_1 - p_3) (Q - D) & \text{if } D < Q \end{cases}$$

The model defined above could be used for any available quantities of D and Q . The advantages of this model are:

- 1) The system is open to anyone in the organization for application
- 2) Instantaneous and accurate calculation is possible
- 3) Enables computerization of the system
- 4) Flexible for review/modification.

This kind of approach is called systematic approach or programmable decisions, which is the base for the system development for retrieval of information,

Example for Non-programmed Decisions

Managers are quite efficient to make better decisions as they have got a great deal of experience. Some times decisions need to be taken in the light of the situations and not in general. The persons who are in the field for quite some time will understand easily and the decision can be taken accordingly. For example, to commission a power plant, conducting an in house survey about the past performance of the plant is sufficient to gain adequate information instead of going for a generalized study.

In non-programmed decisions, the conclusions could be arrived through the following, simple steps (Dewey):

- 1) Identify the problem
- 2) Identify the alternatives
- 3) Select the best alternative

Though the programmed decisions are considered to be more accurate, there are some situations in which the assumptions made under this category cannot be fully practical and hence the approach of non-programmed decisions are used. If the decision maker is well experienced, no doubt the accuracy could be maintained and admit that the experience improves the problem solving,

9.10 ENVIRONMENTAL AND COMPETITIVE INFORMATION SYSTEM

The information system developed for business purposes should take into account all the conditions, which affect the business transactions. Usually the two major factors responsible for the business changes are the environmental conditions (local and global) and the comparative factors. Successful development of information systems should have been based on the deep understanding of the organizational structure and dynamics of the enterprise also. For production department the assignment of jobs to machines or machines to operators in a production environment is very important. For a service organization like hospital it may be a duty roster for nurses, doctors or other paramedical staff: Such schedules must be detailed and unambiguous reports could be produced in large number at relatively low cost. Most of the information contained in such reports is internal — to the special shop or hospital. Some organizations are goal oriented, the analyst must be clear as to what information exactly need to be collected, stored and analyzed. Since every information must have a context, only operational information that ultimately has some decision-making contribution must be collected. Secondly, the information collected and processed must be consistent with the level of the organization to which it is to be presented. Organizations have not only found out the immense utility of information systems to better manage their organizations but are also feeling the potential of the competitive advantage provided by, information as a resource. The classic example of the use of information for competitive advantage is SABRE Airline Reservation System of American Airlines and the Frequent Flier Option introduced by Airlines the world over. These are examples that illustrate the use of information not just to run business effectively but also to open up new business vistas.

The payroll represents a typical operational system for the financial management. Since such systems must execute accurately data pertaining to a large number of staff in a timely manner, month after month, cost based efficiency and speed would be a major consideration in the design of such a system.

Detailed Sales Analysis is a must for any sales and marketing function. This might involve a very detailed data collection and processing pertaining to every salesman, every product over a long time span of an entire year or a quarter with even details of the region, market segment etc. Accuracy and timeliness of this effort would decide the quality of tactical and strategic decisions that may be based on summary information generated out of this data. Accuracy and desegregation would be the watchword for such detailed data collection effort.

Naturally information systems must have summary information, with provision for detailed information to provide such information. Comparative analysis shift wise, plant-wise, machine-wise, operator-wise etc. may be necessary. The watch word would be insight and analysis and not mere reporting of data. Variance Analysis for the finance function would call for systems that point out deficiencies, cost over runs, budget excess by carefully matching goal or target information with summary information generated by operational data. Once again the accuracy is important; but what is more important is the clear recognition and highlighting of patterns that can help the decision maker to initiate action and bring systems under control. Timeliness is a must, as the systems must be reset before it is too late.

A tactical system under personnel function is the Performance Appraisal, which would take into account among several other things, the individual employee leave records. The details may not be that important but patterns are. Whenever they are clearly visible. Certain policy conformance may also be checked through such analysis. Since decisions based on such systems are likely to have medium to long-term impact, accuracy should not be underestimated, while keeping the priority of analysis.

Advertising Information System is another example of tactical information system for the marketing function of management. Needless to say planning for advertisement would use much of the information generated by detailed sales analysis (an operational MIS system). But to be able to decide on the levels of advertisement, mix of advertisement, budget for advertisement etc., calls for certain policy parameters as well as environmental (outside organization) information. This point must be clearly borne in mind in designing MIS for tactical decision situations,

A strategic decision by the production function of the management is a New Plant Location. This would use much of the internal information generated by the tactical system designed to analyze the production bottleneck that is internal to the organization. But a long term decision like location of a new plant is likely to be influenced far more by environmental information like changing market, changing technology, changing fiscal and governmental policy like deregulation, tax incentive for backward area etc. Obviously strategic information systems should have a mechanism of scanning and assimilating environmental information that are likely to influence strategic decisions in a systematic way. For the finance discipline, alternative Financing is a strategic decision. It will use a summary status information about the internal finances of the company including payroll, budget, overruns, variance analysis etc. but will be primarily governed by long term policy, business environment etc. that are strategically important to the survival and growth of the organization. Information support for such strategic decision would call for substantial external information supplemented with internal financial health indicators. Decision concerning welfare policy of an organization is a strategic decision that must be faced by personnel (also known as human resource development) management. It will be tempered by internal information about staff size, their quality, and the compensation package etc. but the strategic decision will be governed by the future vision for the organization as seen by the top management as well as the labor market conditions of the environment. Being a long-term decision with major impact on the corporate health of the organization this strategic decision needs to be supported by a balance blend of external and internal information. While we take primarily the decision-making role of the management in the design of the information systems, care must be taken to take into account the stark realities of managerial work-style. The diversity of managerial work, the interpersonal dynamics; politics of people, resistance to change, etc. must also be taken into account. These are issues beyond the scope of this text but must be taken into account in the actual implementation.

A strategic decision for the marketing function is a survey of competition and the resulting strategy of gaining market share. While a detailed analysis of in-company sales and advertising is a necessary prerequisite, much will depend on the present and future strategies of the competitors who are external to the environment. Once again this brings to the focus the importance of external factors for strategic decision. policy likes deregulation, tax incentive for backward area etc. Obviously strategic information systems should have a mechanism of scanning and assimilating environmental information that are likely to influence strategic decisions in a systematic way.

9.11 INFORMATION SYSTEMS IN FUNCTIONAL AREAS AND DECISION-MAKING

Let us discuss some of the information systems in functional areas and their contribution to decision-making.

9.11.1 Marketing

The term marketing as per the American Marketing Association (AMA) is defined as follows:

The process of:

- Planning and executing the conception,
- Pricing,
- Promotion and Distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational objectives.

Marketing function facilitates the activities mostly related to

- Forecasting and sales planning:
 - Market research
 - Advertising
- Operation and control of information required for market

The management of information, which provides output to the above-specified activities, is one of the important aspects in the business. To fulfill the objectives of the marketing, periodic tasks pertaining to collection of data, analysis and presentation in the form of required reports need to be performed. The integrated approach comprising the data input, generation of marketing information and supply of output in the required format is called marketing information system. It consists of people, equipment, and procedure to gather, sort, analyze, evaluate, and distribute timely, and accurate information to decision-making. Marketing information system are expected to help the management in decision processing for pricing the product, packaging, new product development, product mix analysis, advertising, product promotion policy, sales strategy, inventory control and production schedule. The data available at one place could be used centrally for the retrieval of required information and information generated by one department could be shared for others to prepare the reports.

The following table depicts the data availability, tools employed and output **expected** in marketing area.

Table 9.4: Data **Availability**, **Tools Employed**, and Output Expected **in** Marketing Area

Data Available	Tools Employed	Output
Sales	Forecasting Methods	Expected Production
Advertisement Expenditure	Optimization Models	Profit Maximization
Territorial Data	Methods of Market Penetration	Market Expansion
Consumer Preference	Brand Switching Tools	Market Segment
Price	Comparative Analysis	Pricing Strategy
Movement of Goods	Inventory Tools	Minimizing the Storage Cost

The development of marketing information system should consist of various **sub-**systems on marketing research, marketing planning, sales analysis and market control. The inputs, processing, and outputs for **these** sub-systems are as follows:

Marketing Research:

Inputs

- Based on external data collated from the industry primarily constituting sales performance **analysis** of a variety of **brands** in various **market** segments of various companies,
- Industrial infrastructure, marketing, **production strength** and weakness,
- Industrial advertising drive and impact,
- Industrial pricing policy and consequences,
- **Internal** data compiled in the **company constituting** sales performance analysis of various brands of **the company** in various market segments,
- **Strategic marketing** attribute and forecast data versus actual sales **performance** data,
- Advertising **budget and actual** spending,
- Infrastructure budgets,
- Prices of products and sales **figures**.

Outputs

- Intensive reports on **industry** wide sales performances,
- Inferences of **results** **compared** to forecasts with respect to past marketing strategy, advertising and pricing **policies**,
- Review of marketing strategy, advertising and pricing policies,
- Market share of the company.

Marketing Planning:

Inputs

- Summarized data from market research.

Outputs

- Review of sales forecasts,
- Product **mix** strategic reports,
- Market mix strategic reports.



Sales Analysis:

Inputs

- Sales data by region/product/personnel in terms of value and quantity,
- Projected sales data by region/product/personnel for comparison with the actual sales.
- Sales data customer wise with the transaction data for invoicing system.

Outputs

- Sales reports region/product/personnel in terms of value and quantity,
- Variance analysis on actual sales versus projected sales,

Marketing Control

Inputs

- Sales data of various products of a company,
- Marketing expense data.
- Summarized output sales analysis constituting sales performance data personnel/
region/product wise.
- Sales transaction data from invoicing and sales systems.

Outputs

- Variance analysis.
- Age analysis,
- Tactical reports on desirable and undesirable trends.

The typical transaction in the marketing sub-system is depicted through the following diagram:

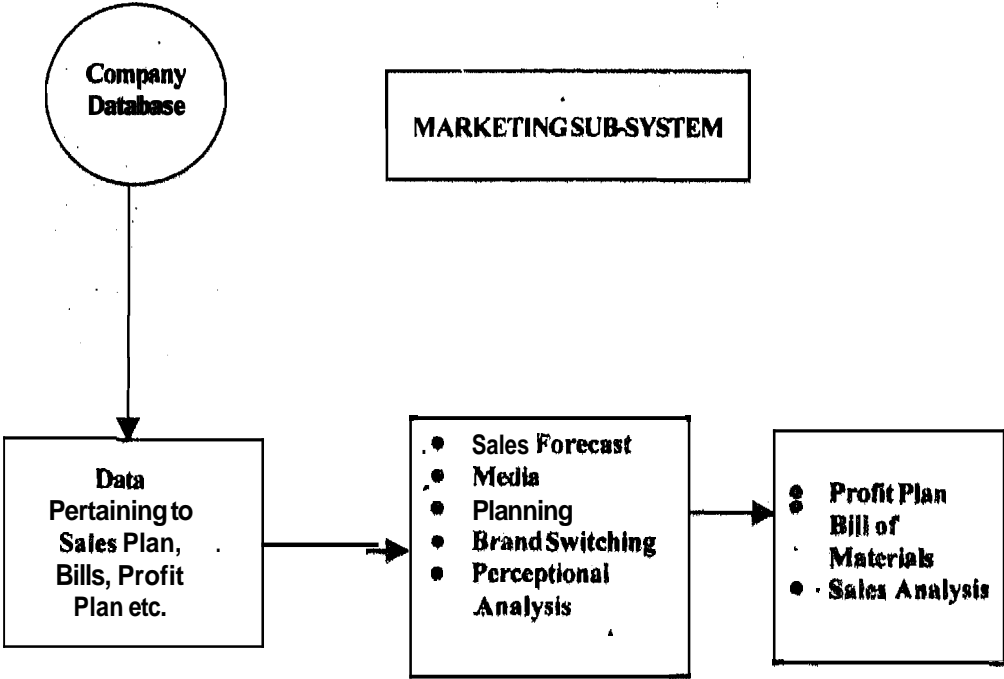


Figure 9.10: Typical Transaction in the Marketing Sub-System

To integrate the activities of marketing, sub-systems are broadly classified on the following types:

- 1) Control systems
- 2) Planning systems
- 3) Market research systems
- 4) Sales systems.

Activity B

Prepare a brief report on the market planning and sales analysis of a company of your choice. What are the benefits derived out of computers and MIS.

9.11.2 Operations Management

The area of management, which deals with the operational activities like production, project scheduling is called Operations Management. The important objectives of operations management are

- Inventory management
- Project scheduling
- Transportation costs minimization
- Assignment of jobs
- Sequencing of jobs
- Queuing

The problems in operations management are well structured. The tools of operations research need to be computerized for better results because of the following reasons.

- Easily structured through mathematical model
- Iterative in nature
- Numerical oriented

The integrated system approach could be shown through the following schematic representation.

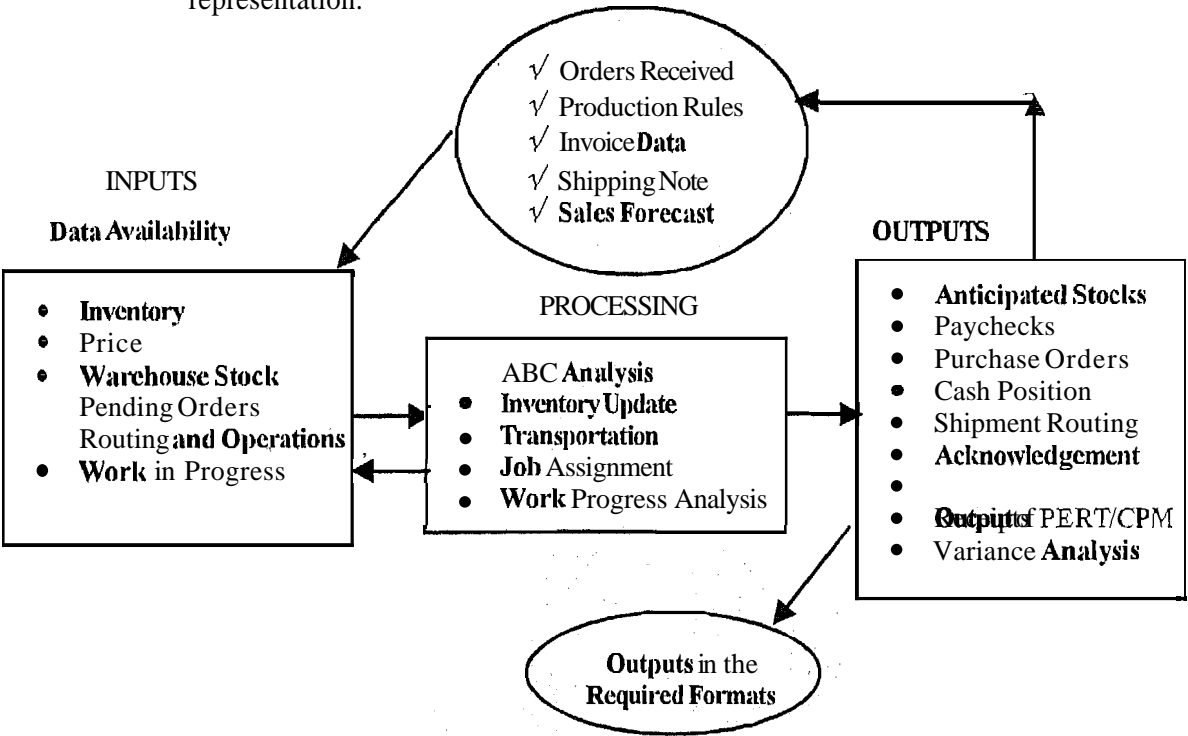


Figure 9.11 : The Integrated System Approach

Inventory Management

Inventory Management system allows you to

- Manage your stocks on a quantity and value basis
- Plan, enter, and check any goods movements
- Carry out physical inventory.

The following are the important activities to be carried out for a better control over the management of inventory.

Managing Stocks by Quantity

In the Inventory Management system, the physical stocks reflect all transactions resulting in a change in stock and thus in updated inventory levels. The user can easily obtain an overview of the current stocks of any given material. For each material, not only the stocks in the warehouse are shown, but also the stocks ordered but not yet delivered, reserved for production or for a customer, and the stocks in quality inspection can be monitored. For example, if a further subdivision by lots is required for a material, one batch per lot is possible. These batches are then managed individually in the stock. Special stocks from the vendor or from the customer (for example, consignment stocks) are managed separately from your company's own stock.

Managing Stocks By Value

The stocks are managed not only on a quantity basis but also by value, a prerequisite for cost accounting. With every goods movement, the following values are updated:

- The stock value for inventory management
- The account assignment for cost accounting
- The corresponding G/L accounts for financial accounting via automatic account assignment.

Both the quantity and the value are updated automatically when entering a goods movement.

Planning, Entry, and Proof of Goods Movements

Goods movements include both "external" movements (goods receipts from external procurement, goods issued for sales orders) and "internal" movements (goods receipts from production, withdrawals of material for internal purposes, stock transfers, and transfer postings). For each goods movement a document is created, which is used by the system to update quantities and values and serves as proof of goods movements. Goods receipt/issue slips are printed to facilitate physical movements and the monitoring of the individual stocks in the warehouse.

Physical Inventory

The adjustment between the physical stocks and the book inventories can be carried out independently of the physical inventory method selected. The System supports the following physical inventory methods:

- Periodic inventory.
- Inventory sampling.
- Cycle counting.

System should be made up of several components linked together so that different departments within a company can cooperate with one another. The invoice Verification component is part of the Materials Management (MM) system. It provides the link between the Materials Management component and the Financial Accounting, Controlling, and Asset Accounting components.

Invoice Verification in Materials Management serves the following purposes:

- It completes the materials procurement process which starts with the purchase requisition, continues with purchasing and goods receipt and ends with the invoice receipt,
- It allows invoices that do not originate in materials procurement (for example, services, expenses, course costs, etc.) to be processed,
- It allows credit memos to be processed, either as invoice cancellations or discounts.

Invoice Verification does not handle the payment or the analysis of invoices. The information required for these processes is passed on to other departments.

Invoice Verification tasks include:

- Entering invoices and credit memos that have been received,
- Checking the accuracy of invoices with respect to contents, prices, and arithmetic,
- Executing the account postings resulting from an invoice.
- Updating certain data in the system, for example, open items and material prices,
- Checking invoices that were blocked because they varied too greatly from the purchase order.

Warehouse Management

Computer support of the organization and management of warehouses has become imperative for efficient and effective processing of logistic requirements within a company. Warehouse Management (WM) system provides the flexible, efficient, automated support that enables you to:

- Manage highly complex warehouse structures and several different types of warehousing facilities including automatic warehouses, custom-designed storage areas, high rack storage, block storage, fixed bin storage and all other commonly used storage areas,
- Define and adapt a variety of storage bins for use in your specific warehousing complex,
Process all relevant warehousing activities and movement tasks, such as goods receipts, goods issues, internal and external stock transfers, automatic replenishment of fixed bins, material staging to production areas and stock difference handling,
- Utilize random slotting for multiple owners of goods,
- Display summary evaluations of all goods movements in the warehouse,
- Implement a variety of readily available put-away and picking strategies including self-designed strategies,
- Support the storage and retrieval of hazardous materials and all other goods that require special handling,

- Maintain up-to-the-minute inventory records at the storage bin level using real-time continuous inventory techniques,
- Support the use of automated barcode scanners and other technology for all stock movements,
- Interface to external warehousing systems,
- Fully integrate your Warehouse Management system for instantaneous interaction with other components to include Materials Management (MM), Inventory Management (IM) Production Planning (PP), Quality Management (QM) and Sales and Distribution (SD).

In addition to supporting the design of all typical storage areas, the WM system provides automated support for several advanced warehousing techniques, such as:

- The analysis of requirements and automatic assignment of goods to optimum locations in the warehouse using put away strategies that can be easily defined to match the characteristics of each storage area,
- The configuration of areas for backorder staging and cross-docking of received goods,
- The setup of "forward pick" areas and production supply areas with automatic continuous replenishment from case or reserve storage when a certain threshold is reached.

Beginning with the planning phase, the WM system carries out stock availability checks whenever transactions are initiated in each of the respective system components. Although it is possible to print material documents for each separate transaction in the warehouse, the WM system facilitates automatic flow through warehousing tasks that are virtually paper-less.

In the Warehouse Management system, you create transfer orders based on transfer requirements. Transfer orders trigger and control the physical movement of goods within the warehouse. The WM system supports the processing of all relevant movements, including goods receipts and goods issues initiated by the Inventory Management (IM) system, deliveries from the Sales and Distribution (SD) system, as well as movements that take place within the warehouse, such as internal stock transfers. With its inventory functions, the WM system ensures that book inventories in the Inventory Management system match the stock in the warehouse, at any time. Because system components are fully integrated, you do not need separate interface programs between the Inventory Management system and the Warehouse Management system.

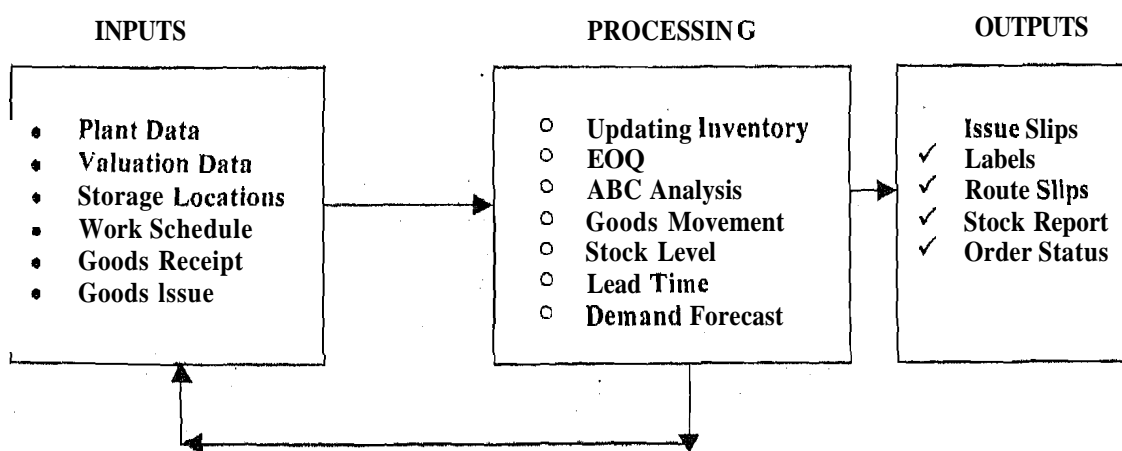


Figure 9.12: The Activities and the Required Outputs for the Development of a System

Y. 11.3 Financial Management

Financial accounting deals with collection, recording, and evaluation of financial data. **Business** enterprise requires systematic maintenance of their records that help for preparing the financial statements like Profit and Loss Accounts and **Balance** sheet. **Accounting** is considered as an information system because it has inputs of financial data, processing by **evaluation** and outputs through financial reports. The importance of financial information **system** for the different users in the managerial area can be depicted as:

Nature of Information	Ultimate User
Cost planning and cost control of operations Profitability of the firm Strategic and tactical decisions	Management
Profitability of the firm Soundness of the investment Growth prospects of the firm	Shareholders and Investors
Liquidity of the firm Profitability and financial soundness	Creditors
Statement of salaries, wages and bonus	Employees
Managing the industrial economy of the country, collection of sales, excise and other taxes	Government
Financial growth of the firm Social role of the firm in different sectors	Consumers and public

To fulfill the needs of financial information the information system used in most of the companies may be classified as under:

- 1) Financial Accounting Systems: To provide information to Government, investors, and other parties in the form of reports
- 2) Management Accounting System: To provide reports to managers for strategic and tactical decisions
- 3) Cost Accounting System: To provide information about cost planning and control operations to the managers

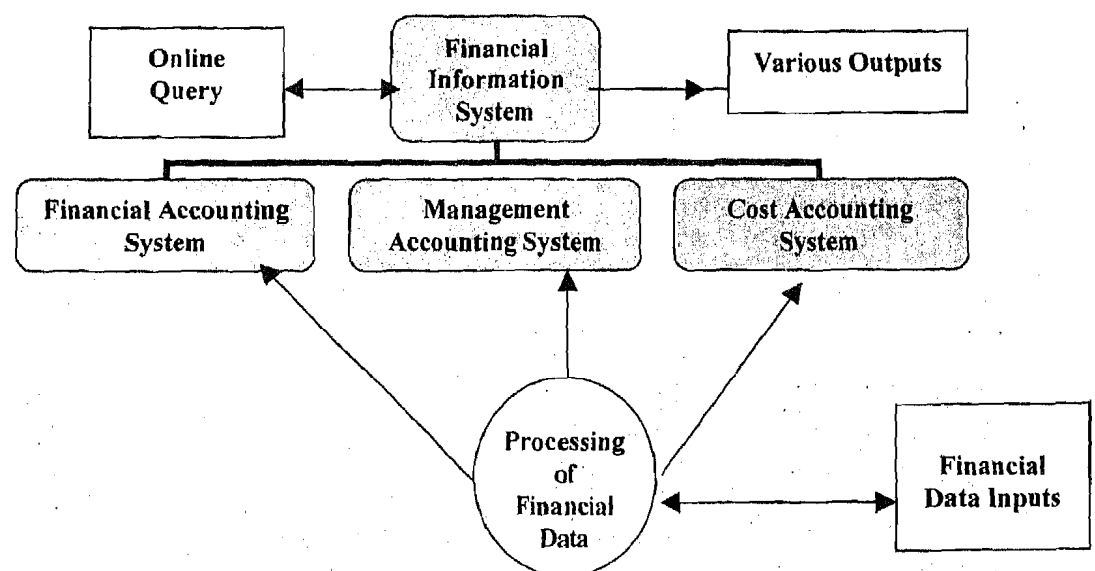


Figure 9.13: Financial Information System

The objectives of implementing computerized financial accounting system include:

- Maintaining Account Books
- Preparation of General Ledger
- Generating Accounts Receivable and Accounts Payable Statements
- Generating profit & Loss Account and Balance Sheet
- Generating Updated Financial Data for other Systems.

Inputs to the System

The input data from the financial system are from:

- Cash Vouchers
- Bank Vouchers
- Sale Vouchers
- Purchase Vouchers
- Journal Vouchers.

Outputs to the System

The outputs expected from the system are:

- Account books like cash book, bank book sale book etc.
- Trial Balance
- Trading Account
- Profit & Loss Account
- Balance Sheet
- Accounts Receivable Statement
- Account Payable Statement.

The Financial management is the most important aspect in managerial functions. Managers quite often require the financial position of the organization for various reasons like planning, monitoring, performance evaluation etc of the companies to decide about further action. In traditional method of information retrieval different kinds of books, ledgers and financial records have been kept to follow up the financial position and by end of each month status used to be calculated. Computerization of financial record not only simplifies the procedure but also is more accurate. With computerization on-line information could be accessed. As most of the companies have gone for the computerized data record, creating a database with required entries will facilitate the storage of information and any kind of manipulation based on the database. A few advanced applications in financial transactions are e-commerce, e-business and on-line banking.

System development for financial management is not only to make the computerized billing or providing the receipts for the transactions. The system integrates number of financial transactions of the organization.

9.11.4 Human Resource Management

The manpower utilized in the organization is treated as a valued asset. The management of this asset is just like management of any other source in an organization. Organizational effectiveness and efficiency, growth of the business, sustainability for the competitiveness can be seen through proper management of human resources. HRD management emphasizes an optimum utilization of human resources by formulating consistent and coherent policies aimed at promoting

commitment to the organization. The information system on HRD is restricted to personnel management systems whose role is to assist in:

- Recruitment,
- Placement,
- Training and development,
- Compensation and
- Maintenance.

The vital area covering the above activities is called Human Resource Planning. HRD system binds functions of personnel management systems with other functions of organization such as marketing, finance, production, and inventory.

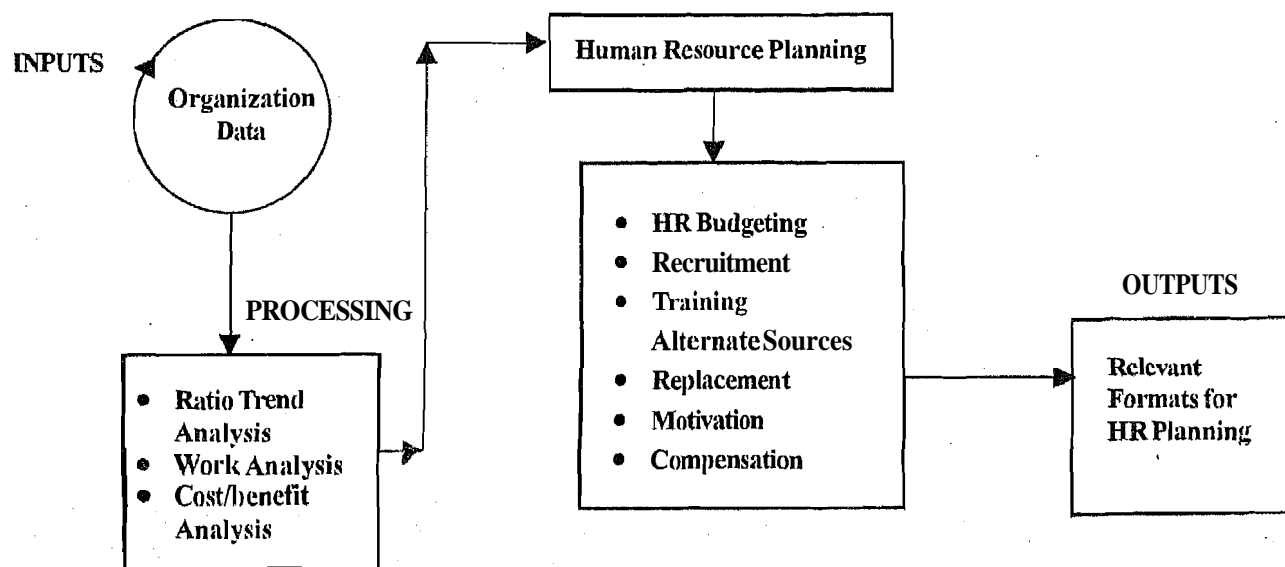


Figure 9.14: HR Information System

9.12 SUMMARY

In this unit, an attempt has been made to explain the importance of information, information generation as a system and role of information in various areas of functional management. We have discussed some of the key points (environmental and competitive) to be kept in mind while going for the development of information systems. Steps in the process have been discussed to familiarize the learners to practice for the development of the business system for the given environment.

Some of the areas left out are project, medical and health care, township, training: fire service, and energy etc. These all have similar needs to build up from the basic inputs a good quality database each and then to evaluate selective data, analyzed data, inter-linked data and aggregated data to derive suitable MIS support to decision making at the corporate level,

9.13 UNIT END EXERCISES

- 1) Discuss the importance of information system for business decisions.
- 2) Distinguish between data, information and knowledge.
- 3) Explain the steps involved in the development of business systems.
- 4) Visit some of the organizations to identify the information systems used for better management. Suggest the ways and means for the improvement.
- 5) Identify and name some of the computerized information systems used in production management, HRD and marketing.

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